A CLINICO–EPIDEMIOLOGICAL STUDY OF MULTIPLE MYELOMA – A HOSPITAL BASED STUDY AT GAUHATI MEDICAL COLLEGE & HOSPITAL, GUWAHATI, ASSAM

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ABSTRACT

INTRODUCTION

Multiple myeloma is the second most common haematological malignancy in the United States**.** Recently, it has been reported that globally approximately 0.8 percent of all cancer cases and 0.9 percent of all cancer deaths are attributed to multiple myeloma (MM) and more than 114,000 new cases were diagnosed in 2012 (0.8 percent of total cancer cases). The last decade has seen major advances in understanding the aetiology, biology of multiple myeloma and advances in therapy have improved survival for patients with myeloma making it prototype for the paradigm of transforming into a chronic illness. This study describes epidemiology, pathology, clinical features, diagnosis and prognosis of multiple myeloma. As an increasing body of literature points to an interplay between the MM and its probable risk factors, pathology, diagnosis and prognosis.

KEYWORDS

Myeloma, Bone Marrow, Plasma Cell.

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INTRODUCTION: Multiple myeloma is a clonal plasma cell malignancy characterised by the proliferation of neoplastic plasma cells.[1] In the year 1873, von Rustizky coined the term multiple myeloma describing about a patient with multiple bone tumour like lesions. Multiple myeloma is the most important class included under plasma cell dyscrasias. It is a clonal plasma cell neoplasm characterised by the proliferation of plasma cells in the bone marrow, monoclonal protein, osteolytic bone lesions, renal disease, and immunodeficiency.[2] Delineation of the mechanisms mediating plasma cell proliferation, survival and migration in the bone marrow microenvironment may enhance the understanding of pathogenesis, and a better understanding of the molecular pathogenesis is fundamental for developing more effective prognostic, therapeutic and preventive approaches.

MATERIALS AND METHODS: This study is based on studies conducted on Clinico-Epidemiological Study of Multiple Myeloma-A Hospital Based Study at Gauhati Medical College & Hospital, Guwahati, Assam. This set of population was studied with a view to understand their risk factors as well as clinical profile. Being a descriptive study, the data were procured from the Outpatient Department of Clinical Haematology, Gauhati Medical College & Hospital, Guwahati, Assam.

Study Setting: The present study was undertaken in the Outpatient Department of Clinical Haematology, Gauhati Medical College & Hospital, Guwahati, Assam.

Study Period: The study period was three years commencing from November, 2010 to October, 2013.

Study Population: The study population comprised of 100 number of newly diagnosed cases of multiple myeloma attending the Department of Clinical Haematology of Gauhati Medical College & Hospital, Guwahati, Assam during the period of November, 2010 to October, 2013. Before the study, clearance from Institutional Ethical Committee was obtained. Analysis of data was done in the year 2014-15.

The Sample: Purposive sampling was followed. Sample size of 100 number of newly diagnosed multiple myeloma patients were purposefully taken into the study during the period of November, 2010 to October, 2013.

Selection of Cases: The 100 multiple myeloma cases were selected into the study among the patients of all age groups attending the Department of Clinical Haematology of Gauhati Medical College & Hospital, Guwahati, Assam during the period of November, 2010 to October, 2013. Initially, patients were selected purely on clinical ground and then negative cases were excluded after diagnosis based on International Myeloma Working Group (IMWG) criteria for diagnosis of monoclonal gammopathies.

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Inclusion Criteria: One hundred newly diagnosed cases of multiple myeloma of all age group from November, 2010 to October, 2013.

Exclusion Criteria: (1) Old diagnosed cases of multiple myeloma that are under treatment. (2) Monoclonal gammopathy of undetermined significance (MGUS). (3) Asymptomatic (smoldering) multiple myeloma. (4) Treatment part of multiple myeloma.

Protocol: The proforma was prepared based on universal standard protocols for evaluation of multiple myeloma which contains separate history, examination and investigation parts. The International Myeloma Working Group. (IMWK) Criteria for classification of monoclonal gammopathies, multiple myeloma and related disorders were used for diagnosis of the disease. Then, staging was made according to International Staging System (ISS). Performance status of patients was made according to Eastern Co-operative Oncology Group (ECOG) standard performance protocol.

Proforma: Section–1: Particulars of patients, Section–2: Clinical history, Section–3: Clinical examination and Section–4: Diagnosis and staging.

STATISTICAL ANALYSIS: Data were analysed using statistical package and results and observations were presented in tabular form. Statistical tests were applied wherever required.

RESULTS AND OBSERVATIONS:

Age group (in years)	Males		Females		Total	
	No.s	%	No.s	%	No.s	%
30–39	4	5.97	2	6.06	6	6
40–49	14	20.90	11	33.33	25	25
50–59	17	25.37	11	33.33	28	28
60-69	22	32.83	8	24.25	30	30
70-79	7	10.45	1	3.03	8	8
80–89	3	4.48	0	0	3	3
Total	**67**	**100**	**33**	**100**	**100**	**100**

Table 1: Age and Sex Distribution of the Patients

N=100

From the table 1, it is observed that majority of the patients are of the age group 60-69 years, both in case of males and females. In the study, 67 percent patients (n=67) were males and 33 percent (n=33) were females, giving a sex ratio of 2.1. Moreover, it shows that 6 percent (n=6) of the patients fall in the age group 30-39 years, 25 percent (n=25) in 40-49 years, 28 percent (n=28) in 50-59 years, 30 percent (n=30) in 60-69 years, 8 percent (n=8) in 70-79 years and 3 percent (n=3) in 80-89 years of age group. The youngest patient was 33 years while the oldest was 84 years. The median age was 56 years. The statistical analysis shown in the table 1 reveals that (1) the mean age for male is 58.43 years with SD of 12.16 and coefficient of variability (Cv) is 20.81. The mean age for female is 53.48 years with SD of 9. and coefficient of variability (Cv) is 17.9. So, mean effect age for male patient is more than that of female. Again, the variability for male age for affect is more than that for female. There is significant difference between mean age of male and female with the disease. (Test statistics: 'Z' test for difference of means, calculated value of 'Z'=2.22; p=0.0645, conclusion=significant). Considering the age factor of male (p=0.0028), female (p=0.0013) and the sample as whole (p=0.000026), it is found that in all cases there exists significant differences of prevalence of MM in different age group. In case of male, prevalence of multiple myeloma is more in the age group of 60-69 years and in case of female, the significant age group is 50-59 years. Also, the statistical analysis reveals that the prevalence of MM is significantly (p=0.00046) high among males.

History of Radiation exposure	Males		Females		Total	
	No. s	%	No. s	%	No. s	%
X-ray	12	17.91	8	24.24	20	20
CT-scan	2	2.99	2	6.06	4	4
Professional exposure	1	1.49	00	00	1	1
No exposure	52	77.61	23	69.70	75	75
Total	**67**	**100**	**33**	**100**	**100**	**100**

Table 2: Distribution of History of Exposure to Diagnostic Radiation of the Patients

N=100

The above table-2 shows that a significant number of patients comprising of 75 percent (n=75) had no history of any radiation exposure. A total of 20 percent of the patients (n=20) had history of X-ray exposure, 4 percent (n=4) CT scan exposure and one percent (n=1) gave history of professional exposure to radiation. The statistical analysis shown in the table-2 reveals that there exists a significant difference ($p<0.0001$) in the number of patients belonging to the two groups, exposure to radiation and non-exposure. A significant number of patients were not exposed to any kind of radiation. Also, the statistical study on the exposure group reveals that there exists a significant difference ($p<0.0001$) in the number of patients with reference to exposure to different types of radiation. Among them, a highly significant number of patients were exposed to X-ray.

Presenting symptoms	Males		Females		Total	
	No.	%	No.	%	No.	%
Bone pain	29	43.28	15	45.45	44	44
Fatigue	28	41.79	13	39.39	41	41
Fever	4	5.97	2	6.06		6
Hyperviscosity symptoms	2	2.99	0	0	2	2
Bony swelling	1	1.49	1	3.03	2	2
Fracture	1	1.49	1	3.03	2	2

Altered sensation of lower limbs	1	1.49	0	0	1	1
Paralysis of lower limbs	1	1.49	0	0	1	1
Pain in the eye	0	100	1	3.03	1	1
Total	**67**	**100**	**33**	**100**	**100**	**100**

Table 3: Distribution of Presenting Symptoms

N=100

The above table 3 shows that bone pain was the most common presenting symptom observed in 44 percent (n=44) of the patients followed by fatigue which was observed in 41 percent of the patients (n=41). Other symptoms were fever 6 percent (n=6), hyperviscosity symptoms 2 percent (n=2), bony swelling 2 percent (n=2), pathological fracture 2 percent (n=2), paraesthesia 1 (n=1), paraplegia 1 percent (n=1) and ophthalmoplegia 1 percent (n=1) of the patients. The bleeding manifestations were probably due to hyperviscosity symptoms with main manifestation being bleeding, confusion, altered sensorium or visual disturbances. Even though the exact cause of these symptoms as hyperviscosity could not be ascertained, but still, other commonest causes of these symptoms were excluded. The statistical analysis shown in the table 3 reveals that there is significant difference (p=0.00001) in the numbers of patients with reference to different presenting symptoms. From the analysis, it can also be inferred that a highly significant number of patients have the symptoms of bone pain and fatigue. In case of bone pain, the p value and Z value for male is 0.0012 and 0.135 respectively. In case of fatigue, the p value and Z value is 0.0038 and 0.185 respectively. So, difference between the proportion of bone pain and fatigue with reference to the male and female is insignificant.

M-band in SPEP (g/dL)	Male		Female		Total		N	Mean	SD	Min	Max
	No.s	%	No.s	%	No.s	%					
0	12	17.91	7	21.21	19	19	100	2.992	2.344	0	8.8
0.1–2	14	20.90	7	21.21	21	21					
2.1-5	26	38.80	12	36.37	38	38					
>5	15	22.39	7	21.21	22	22					
Total	**67**	**100**	**33**	**100**	**100**	**100**					

Table 4: Distribution of M Band in Serum Protein Electrophoresis

N=100

The above table-4 shows that there were 19 percent (n=19) of the patients who did not show an M band in electrophoresis, more than 5 g/dL was found in 22 percent (n=22) patients, 2.1-5 g/dL in 38 percent (n=38) and 0.1-2 g/dL in 21 percent (n= 21) of the patients. The maximum value was 8.8 g/dL and minimum 0 g/dL. Thus, in 19 percent (n=19) of our patients, non-secretory pattern electrophoresis was noted in our study. Statistical analysis reveals that there exists significant difference (p= 0.0267) in the number of patients with reference to M-band in serum protein electrophoresis and the most significant group of patients is found to be having M-band in serum protein electrophoresis in the interval 2.1- 5 g/dL.

The table 5 shows frequency table of Urinary Bence Jones Protein at baseline. It was present in 44 percent and absent in 56 percent of the patients. This shows that urine BJP was not a consistent finding in our study so as to give a diagnostic significance, but might be of prognostic significance if the overall survival pattern is considered. The statistical analysis shown in the table 59 reveals that there does not exist a significant difference (p=0.775) in the number of patients with reference to presence and absence of BJP. Moreover, there is less significant association of urinary BJP at baseline with sex of patients. (Test statistic: X^2, Calculated value of X^2=1.467, P=0.00854).

Urinary BJP at base line	Males		Females		Total	
	No.	%	No.	%	No.	%
Present	30	44.78	14	42.42	44	44
Absent	37	55.22	19	57.58	56	56
Total	**67**	**100**	**33**	**100**	**100**	**100**

Table 5: Distribution of Urinary Bence Jones Protein (BJP) at Baseline of Patients

N=100

Plasmacytosis (%)	Male		Female		Total		N	Mean	SD	Min	Max
	No.	%	No.	%	No.	%					
<10	2	2.98	1	3.03	3	3	100	48.86	15.11	3	90
11-30	4	5.97	2	6.06	6	6					
31-50	43	64.17	22	66.67	65	65					
.>50	18	26.88	8	24.24	26	26					
Total	**67**	**100**	**33**	**100**	**100**	**100**					

Table 6: Distribution of Results of Bone Marrow Examination

N=100

The above table-6 shows that less than 10 percent plasma cells were present in 3 percent (n=3) of the patients, 10-30 percent in 6 percent (n=6) of the patients, 31-50 percent in 65 percent (n=65) of the patients and more than 50 percent in 26 percent (n=26) of the patients. The abnormal plasma cells ranged from 3-90 percent. The mean was 48.86 percent with a SD of 15.11 percent. The statistical analysis shown in the table-6 suggests there exists significant difference ($p<0.00001$) in the number of patients with reference marrow plasmacyte levels. Also, a significantly large group of patients are found to have marrow plasmacytes in the limit of 31-50 numbers.

Radiological findings	Male		Female		Total	
	No.	%	No.	%	No.	%
Punched out lytic areas	29	43.28	15	45.45	44	42
Osteopenia	36	53.73	17	51.52	53	52
Pathological fracture	2	2.99	1	3.03	3	6
Total	**67**	**100**	**33**	**100**	**100**	**100**

Table 7: Distribution of Radiological Imaging of Patients

N=100

The above table 7 shows that generalised Osteopenia was the main finding which was present in 53 percent (n=53) of the patients. The characteristic punched out lytic lesions were present in 44 percent (n=44) of the patients and 6 percent (n=6) of the patients had pathological fractures of which 3 were belonged to vertebrae and 3 to long bones. Thus the main radiological abnormalities that was present in our study were osteoporosis, pathological fractures and punched out lesions. Statistical analysis reveals that there exists highly significant difference ($p<0.00001$) in the number of patients with reference to their radiological findings. From the analysis it is found that a significantly high number of patients have Osteopenia where as a very insignificant group of the patients have pathological fracture. Moreover, there is no significant association between the types of radiological findings on sex of patient. (Test statistic: X^2, calculated value of $X^2=0.025$, $p=0.00064$).

β2 -M (mg/L)	Male		Female		Total		N	Mean	SD	Min	Max
	No.	%	No.	%	No.	%					
<3.5	16	23.88	7	21.21	23	23					
3.5-5.4	31	46.27	14	42.42	45	45	100	48.86	15.11	1.8	45.5
≥5.5	20	29.85	12	36.37	32	32					
Total	**67**	**100**	**33**	**100**	**100**	**100**					

Table 8: Distribution of β2 Microglobulin of Patients

N=100

The above table-8 shows a normal range value of less than 3.5 mg/L was found in 23 percent (n=23) of the MM patients. The maximum number comprising of 45 percent (n=45) of the patients had 3.5-5.4 mg/L. In the rest 32 percent (n=32) of the patients, it was more than equal to 5 mg/L. The minimum level was 1.8 mg/L and maximum was 45.5 mg/L with mean value of 48.86 mg/L. Thus β2-microglobulin was significantly elevated in most of our patients. Statistical analysis reveals that there exists significant difference ($p=0.0259$) in the number of patients with reference to their β2 microglobulin. Also, it is found that a significantly more number of patients have β2 microglobulin in the range of 3.5-5.4 mg/L.

Discussion (With Reference To the Results & Observation As Mentioned Above):

1. **Age and Sex:** It appeared in the SEER Stat Fact Sheets (2014)[3] report that in USA from 2002 to 2012, the incidence of multiple myeloma was highest between the age group 65-74 years (28.2 percent), lowest in between 20-30 (0.6 percent) years and no incidences bellow 20 years. 75.7 percent of the patients were in the age group of 55 to 85 years. Kyle RA et al.(2003)[4] also found that 2 percent of his 1027 myeloma patients were younger than 40 years and 38 percent were older than 70 years. The median age was 66 years. Eighty percent of the patients were in their 6th, 7th or 8th decade of life. Gupta P et al. (1995)[5] in a twelve year study of multiple myeloma at AIIMS, New Delhi, India, found a mean age of 52 years at presentation and 12 percent were younger than 40 years. In Kyle RA et al.'s (2003)[4] study, male-female ratio was 1.5:1. Gupta P et al. (1995)[5] in his study found 101 males and 45 females giving a male female ratio of 2.24:1. Parkin DM et al. (2002)[6] and Ries LAG et al. (2005)[7] also demonstrated male excess in multiple myeloma. Thus, the present study was also having nearly similar age wise incidence, though the mean age is lower than Kyle RA's (2003)[4] study, but slightly higher than Gupta P. et al's (1995)[5] study. Thus, the present study also shows similar sex ratio with male preponderance for the disease as was there in the other Indian study although there was disparity with some western studies.

2. **Past Radiation Exposure:** Cogliano et al. (2011)[8] reported that that X-ray radiation and gamma radiation are classified by IARC as probable causes of myeloma, based on limited evidence. Boice JD et al. (1991)[9] showed association between diagnostic radiation and MM. Van Kaick G et al. (1999)[10] demonstrated that exposure to thorium dioxide (an X-ray contrast medium) have increased risk of plasmacytoma more than 4-fold among patients examined with cerebral angiography or arteriography of the limbs. Hatcher JL et al. (2001)[11] proposed no significant association between diagnostic radiation and multiple myeloma. Our findings are consistent with various other studies like those by Cogliano et al. (2011), Boice JD et al. (1991)[9] and van Kaick G et al. (1999)[10]

3. **Presenting Symptoms: Bone Pain:** In our study, bone pain was the chief complaint observed in 44 percent (n=44) of the patients. Gupta et al. (1995)[5] found bone symptoms in 79 percent of the myeloma patients. Kyle RA (2003)[4] observed bone pain as a symptom in 58 percent of the MM patients. Ong et al. (1995)[12] and Riccardi et al. (1991)[13] observed bone pain in 53 and 34 percent of the MM patients respectively. Blade J and Kyle RA (1995)[14] observed bone pain in 66 percent cases of the MM patients who were younger than 40 years. Thus, our findings are consistent with these studies.

4. **M-band in Serum Protein Electrophoresis (SPEP):** Kyle RA. (2003)[4] observed M band in 82 percent of the MM patients. Gupta P et al. (1995)[5] described M protein in serum in 74 percent of the myeloma patients. G.D. Miralles et al. (1992)[15] described M-band in 87 percent of the myeloma patients. Kyle RA. et al. (2003)[4] in his study of 1027 cases of multiple myeloma, nonsecretory myeloma was recognised in 3 percent of the patients. Thus, our study results correlated with the studies of Kyle RA. (2003),[4] Gupta P et al. (1995),[5] and G.D. Miralles et al. (1992)[15]

5. **Urinary Bence Jones Protein (BJP)** Gupta P et al. (1995),[5] Riccardi A et al. (1991)[13] and Thakur Y S et al. (1997)[16] demonstrated urine BJP in 47 percent, 47 percent and 44.45 percent of the MM patients respectively. Thus, most of the studies had similar values to ours.

6. **Bone Marrow Studies:** Gupta P et al. (1995)[5] in their study observed bone marrow plasmacytosis of more than 10 percent in 94 percent of the myeloma patients. Kyle RA. (2003)[4] found bone marrow plasma cells of more than 10 percent in 96 percent of the myeloma patients. Thus, the above studies have almost similar values to ours.

7. **Radiological Imaging Studies:** Kyle RA (2003)[4] in their study observed lytic lesions in 67 percent of the MM patients, and 20 percent of patients had osteoporosis, pathological fractures, or compressive fractures of spine. Gupta P et al. (1995)[5] found multiple lytic lesions in 25 percent, pathological fractures in 11 percent and normal skeletal X-ray in only 4 percent of the myeloma patients. Thus, regarding the punched out lytic lesions, value of our study lies in between Kyle RA's (2003)[4] study and Gupta P et al's (1995)[5] study. But, regarding osteopenia our value is higher than the two studies. This shows that in multiple myeloma at presentation, the rate of osteopenia and bone destruction is more in our study.

8. **β2-Microglobulin (β2-M):** Kyle RA's (2003)[4] study, 75 percent of the myeloma patients had a value >2.8 mg/L and the median was 3.9. Blade J (1995),[14] found β2-M value >2.8 mg/L in 58 percent of the MM patients. The observations from our study are almost comparable with these studies.

SUMMARY AND CONCLUSIONS: In our study, our work on the aetiology of multiple myeloma has focused on understanding the potential risks associated with longterm environmental and occupational exposures and lifestyle factors.

1. **Factors with Significant Risk for Development of Multiple Myeloma are:**
   (A) Age (50-70 years).
   (B) Farmers: Exposure to pesticides of the farmers at any frequency for more than 10 years may act as risk factor for causation of multiple myeloma which is more common in farmers working in agriculture than farming.
   (C) Intoxicants: Various intoxicants may act as a risk factor for causation of multiple myeloma. Different types of tobacco are equally responsible for causation of multiple myeloma where duration, quantity and current consumption plays insignificant role. However, habit of consuming alcohol does not act as a risk factor of multiple myeloma and those consuming less alcohol are more vulnerable to develop myeloma.
   (D) Exposure to radiation for long duration (more commonly X-ray).
   (E) Past history of pneumonia.
2. Factors having insignificant risk for developing multiple myeloma are family history of multiple myeloma, breast cancer and lung cancer; among fruit and pesticide sellers who are with the profession for more than 10 years; fisherman who worked in that profession for more than 5 years; non-vegetarian; vegetarians with history of taking frequent butter for long duration; carpenters; past medical history like eczema, shingles (herpes zoster)/hepatitis C virus infection/venereal disease; various professions like–photographers, hair dresser, laboratory technicians, veterinary professional,

cobbler, chemist, book binders, painters, jewellery workers, metal workers, workers of petrol pump, type setter, worker of wood and leather factory, workers of rubber and plastic factory, workers of bamboo factory, workers of asbestos industry, industry workers where pesticides are used, workers of textile industry and workers of road.

3. The factors that does not effect on development of multiple myeloma are religion, family type, ethnicity, driver, rickshaw puller, priest, sweeper, and hookers.

4. Occurrence of sequence of clinical features of multiple myeloma at diagnosis may be as-

(A) Presenting symptoms-bone pain, fatigue, fever, hyperviscosity syndrome, bony swelling pathological fracture, paraesthesia, paraplegia and ophthalmoplegia.

(B) The presenting signs-anaemia, renal failure, infection, hepatomegaly, splenomegaly lymphadenopathy, neuropathy, plasmacytoma, ocular plasmacytoma and dermatitis. Among pathological fractures, 3 percent fracture of spine and 3 percent fracture of long bone.

(C) Nutritional status-moderate nutrition (42%), 30 percent malnutrition (30%) and good nutrition (28%).

(D) Associated diseases-osteoarthritis, hypertension, chronic prolapsed intervertebral disc, diabetes, hypothyroidism, gout, chronic obstructive pulmonary disease, chronic liver disease, eczema, haemorrhoids, haemoglobinopathy, tuberculosis, varicose veins and others.

(E) ECOG performance status of the patients-stage 0 (6% of the patients), stage 1(24%), stage 2(33%), stage 3(35%) and stage 4(2%).

(F) Moreover, eight percent of multiple myeloma patients may be obese.

5. Investigation parameters of multiple myeloma patients may be as:

(A) Complete blood count picture-leucopenia (24% of patients), thrombocytopenia (10%) thrombocytosis (10%) and Rouleaux formation (56%).

(B) Hb-mean 8.73 g/dL with a S.E. of 0.258 and S.D of 2.58, median 8.24 (range 3.4-13.2 g/dL), Hb<6 g/dL (9% of patients), 6.1-8 g/dL (24%), 8.1-10 g/dL (40%), 10.1-12 g/dL (20%) and >12.1 g/dL. (7%).

(C) ESR at the end of first hour (AEFH)-0-50 mm in (12% of patients) 51-100 mm (30%), 101-150 mm (39%), >150 mm (19%), (range 10-150 mm), mean 107.5 mm with S.E of 4.60 and S.D of 46.03 and median value 106.75 mm.

(D) Creatinine level-< 1.2 mg/dL (84% of patients), 1.3-1.9 mg/dL (10%), > 2 g/dL (6%), (range 08-13.8 mg/dL), median value of 1.80 g/dL., mean 1.96 with a S.E of 0.36 and S.D of 3.601.

(E) Serum Calcium level ->11 mg/dL (36% of patients), >8 mg/dL (8%), 8-11 mg/dL (56%), range (7.2-13.8 mg/dL), mean 10.39 mg/dL with SE of 0.16 and SD of 1.69., median 8.56 mg/dL.

(F) Serum total protein ->6.3-8.2 g/dL (52% of patients), 6.3-8.2 g/dL (48%), median 8.13 g/dL., mean 8.01 g/dL with a SE of 0.205 and SD of 2.05. range (6.2-15.2 g/dL).

(G) Serum albumin -< 3.5 g/dL (26% of patients), >3-5 g/dL (4%), 3-5 g/dL (70%), median value 4.12 g/dL, mean 3.995 with a SE of 0.505 and SD of 3.05, range (1.3-5.8 g/dL).

(H) Serum globulin-<3.5 g/dL (28% of patients), >3.5 g/dL (72%)., range (2.6-13.2 g/dL), median 4.59 g/dL., mean 3.816 with a SE of 0.302 and SD of 3.02 .

(I) Serum M band ->5 g/dL (22%), 2.1-5 g/dL (38%), 0.1-2 g/dL (215), range (0.8.8 g/dL). 19 percent of the patients may not show M band in serum.

(J) Urine BJP-present in (64.28% of patients) and absent in (35.71%).

(K) Bone marrow examination -<10 percent plasma cell (3% patients), 10-30 percent plasma cell (6%), 31-50 percent plasma cells (65%) and >50 percent plasma cells (26%), 3-90 percent abnormal plasma cells, mean 48.86 percent with a SD of 15.11 percent.

RECOMMENDATIONS:

1. The clinical manifestations of plasma cell dyscrasias range from total absence of any symptoms in subjects with MGUS to formation of tumours, paraproteinaemia, hypogammaglobulinaemia, bone disease, especially osteolytic lesions, hematopoietic and immune dysfunction, abnormalities of renal functions, neurological abnormalities and infections. Differentiating multiple myeloma from other causes with similar features and from other plasma cell dyscrasias is important for prognosis and treatment. Evaluation of patients suspected of multiple myeloma in a timely fashion is also critical, as a delay in diagnosis can have a negative impact on the disease course.
2. Health education of the society should form an important aspect of the health care so that they could learn certain do's and don'ts related to different diseases like multiple myeloma and inculcate these in their behavioural patterns through constant practice so as to prevent the occurrence of diseases or reduce the effects of illness. The common symptoms of multiple myeloma which are similar to common diseases should be included in the health education programme so that it can be detected early. Environmental, occupational and life style factors which are risk for development of multiple myeloma should be included into the health education programmes so that the disease can be prevented.

3. Moreover, some screening tests should be held periodically by the health agencies to detect the disease early especially in elderly people who are at risk of having environmental, occupational and lifestyle factors for development of multiple myeloma. Encouraging the health agencies to organise periodic camps, health mela for screening of the disease.
4. Preventive maintenance is wiser and less expensive than crisis management. So, promoting awareness about the concept of environmental, occupational and life style risk factors for development of multiple myeloma and its common symptoms and to involve community in the process of their mitigation, there is need to conduct awareness campaign programmes in the community level.
5. As clinical features of multiple myeloma are similar to clinical features of common diseases, once encountering such features, physician should be intended to find out or rule out multiple myeloma routinely to detect it early. In this connection, mandatory instruction may be instituted by the health agencies.
6. However, with a known familial clustering more research is needed on inherited genetic factors predisposing to the development of multiple myeloma. With the recent confirmation that MGUS probably always precedes the development of multiple myeloma, further research efforts should seek the causes of MGUS and the genetic events that lead to its progression to multiple myeloma.
7. Our study is a hospital based study with a small sample size. Hence, further community based large research with bigger sample is needed to examine whether any inconclusive factors contribute as important attributes to the causation of multiple myeloma.
8. The study was a descriptive study. So any conclusions drawn will have to be guarded and will have to confirm with further trials in India.

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